

## Address

Address represents identity of node, components or services in IT infrastructure. It is required for successful transmission of data.

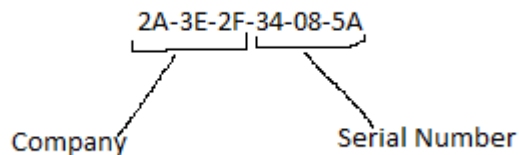
Different forms of Address :

1. Physical Address
2. Logical Address
3. Port Address
4. Special Address

## Physical Address

1. This address is available at all those devices which can be connected to network through wired or wireless media.
2. Physical address is present at NIC ROM.
3. It is also known as Hardware Address / MAC address.
4. It is attached with data frames at Data Link Layer of OSI Ref. Model.  
So, It is helpful in node to node delivery of data frames.
5. Ex. 2A-3D-4F-00-74-8C
6. Broadcast MAC Address = FF-FF-FF-FF-FF-FF
7. It is represented into Hexadecimal.
8. It has 12 Hexadecimal characters ( 48 Bits )

9. First 6 characters represents manufacturer company and last 6 characters represents serial number given by manufacturer company. So, this address is always globally unique.
10. Commands to see MAC address :
- C:> getmac
  - C:> ipconfig /all
  - ifconfig



## Logical Address

- This address is managed by Internet Protocol (IP). So, it is also known as IP address.
- It works at Network Layer of OSI Ref. Model.
- It is a combination of number that can be managed manually or through DHCP server. So, it is known as logical address.
- It provides unique identity to network nodes locally or globally.
- It is responsible for source to destination delivery of data packets.

Types of IP address / Version of IP address :

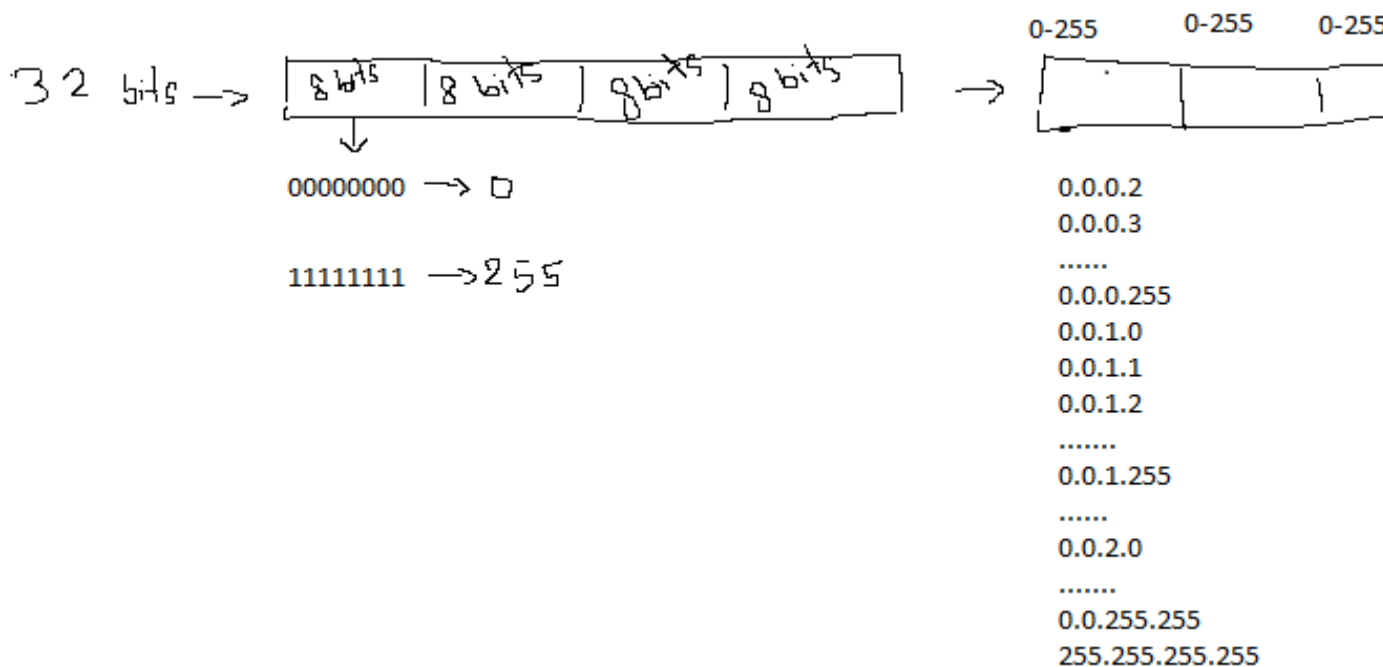
- IPv4 Address
- IPv6 Address

### IPv4 Address :

- Developed by DARPA ( Defence Advanced Research Projects Agency ) in 1981.
- Managed and distributed by IANA ( Internet Assigned Number Authority ).
- Represented into dotted decimal number.
- It has 32 bits divided into 4 groups each having 8 bits.
- It supports approx 3.2 million IPv4 addresses.

6. It supports unicasting, multicasting and broadcasting transmission way.
7. It is divided into 5 classes. -> A, B, C,D,E

Now, we will understand the concept of IPv4 address:



0-255			
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The value of first octet is divided to form different classes.

0-127 -> Class A

128-191 -> Class B

192-223 -> Class C

224-239 -> Class D

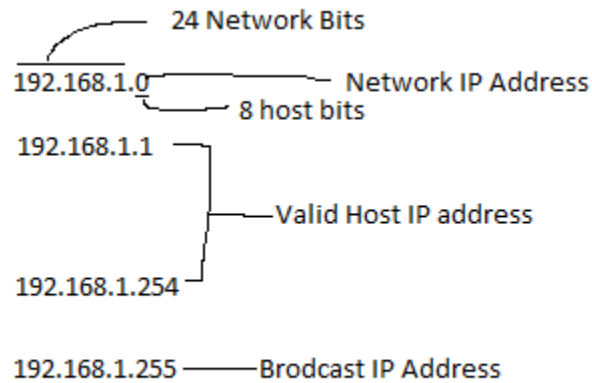
240 -255 -> Class E

Few important concepts before understanding these classes:

1. Network Bits - This value defines different series of IP address.
2. Host Bits - This value defines number of hosts in a network series.
3. Network IP address - The very first IP address of a network series which defines the a network.
4. Broadcast IP address - The very last IP address of a network series which is used for broadcasting in the network

5. Subnet-mask – This value defines the range of IP address in a network and defines different networks.

Example:



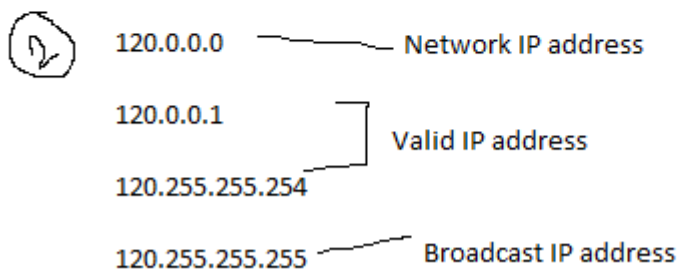
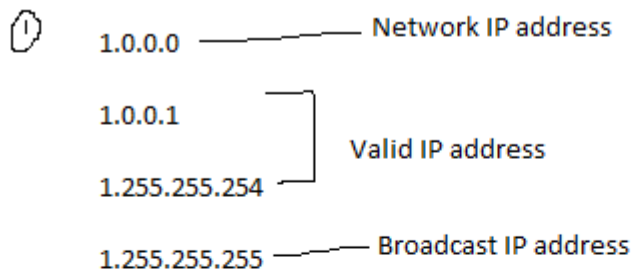
## Class A

0-127	0-255	0-255	0-255
Net. Bits	Host Bits	Host Bits	Host Bits

Important Points:

1. It has 8 bits of network and 24 bits of host.
2. Number of default networks = 128
3. Number of valid hosts IP address in each default network =  $2^{24} - 2 = 16777214$
4. Default subnetmask = 255.0.0.0

Example:



## Class B

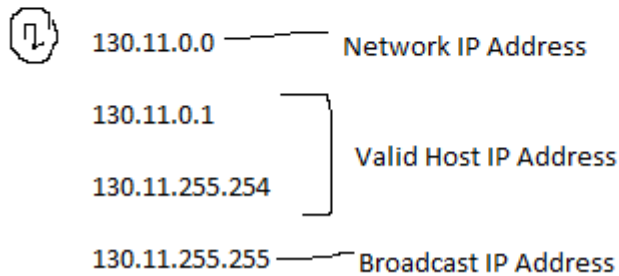
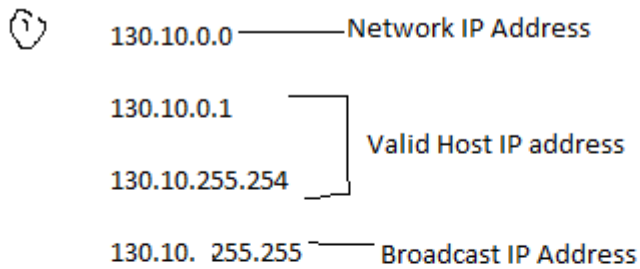
128-191	0-255	0-255	0-255
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Net. Bits      Net. Bits      Host Bits      Host Bits

Important Points:

1. It has 16 bits of network and 16 bits of host.
2. Number of default networks = 16384
3. Number of valid hosts IP address in each default network =  $2^{16} - 2 = 65534$
4. Default subnetmask = 255.255.0.0

Example:



## Class C

192-223	0-255	0-255	0-255
Net. Bits	Net. Bits	Net. Bits	Host Bits

Important Points:

1. It has 24 bits of network and 8 bits of host.
2. Number of default networks = 2097152
3. Number of valid hosts IP address in each default network =  $256 - 2 = 254$
4. Default subnetmask = 255.255.255.0

Example:

①

192.168.0.0 ——— Network IP Address

192.168.0.1  
192.168.0.254 ] Valid Host IP address

192.168.0.255 ——— Broadcast IP address

②

192.168.1.0 ——— Network IP address

192.168.1.1  
192.168.1.254 ] Valid Host IP address

192.168.1.255 ——— Broadcast IP Address

③

192.170.1.0 ——— Network IP Address

192.170.1.1  
192.168.1.254 ] Valid Host IP address

192.168.1.255 ——— Broadcast IP address

## Class D

Few Points :

1. All 32 bits represents network.
2. No any host bits
3. It is used for multicasting only by different services( Protocol ), in TV channels, etc.

Example:

OSPF uses 224.0.0.5 and 224.0.0.6

RIP - 224.0.0.9

EIGRP - 224.0.0.10

NTP - 224.0.1.1

DHCP - 224.0.0.12

IGMP - 224.0.0.22

mDNS - 224.0.0.251

Link Local Multicast IP Address - 224.0.0.252

## Class E

This class is not used for any purpose.

## Reserved IP Addresses:

Class A -> 0.0.0.0 -> Reserved for Default route

127.0.0.1 -> Reserved for loopback testing

Class B -> 169.254.x.y -> Reserved for APIPA

## Private IP Address

These addresses are used in local network. It does not require any reservation before use. In Class A, B and C few series have been defined as Private IP address.

Class A -> 10.0.0.0 to 10.255.255.255

Class B -> 172.16.0.0 to 172.31.255.255

Class C -> 192.168.0.0 to 192.168.255.255

## Public IP Address

**After** excluding reserved and private IPv4 addresses, rest IP addresses of class A, B and C are Public IP addresses. It is used for global unique identity in the network.